

3D Print/Additive Manufacturing Industry Day

December 10, 2015





- Benefits of the Schedules Program
- GSA's Strategic Vision for 3D Printing/Additive Manufacturing
- Keynote Speaker: Dr. Peter C. Liacouras, Walter Reed National Military
 Medical Center
- Break
- Industry Capabilities
- Lunch
- Keynote Speaker: Lester Hitch, United States Army, Aberdeen Proving Ground
- MAS Proposal Submission
- Promoting GSA to the Customers
- Federal Marketing Opportunities
- Closing Remarks



Benefits & Advantages of Using GSA's Multiple Award Schedules (MAS)



Key Benefits

- Fast, flexible, cost-effective procurement solution
- Brings together thousands of federal customers and vendors.
- An agency receives the best value and knows the vendor has been vetted and are fair and reasonable.
- Contracts are fully negotiated.
- FAR 6.102(d)(3) states use of MAS is a competitive procedure.



Benefits (Continued)

- Dedicated Team (unprecedented)
 - Contract Specialists & Officers dedicated to the success of this initiative.
- No need for a prospective contractor to research which Schedule or Special Item Number (SIN) they should propose under. We've done this for you.



Time Benefit MAS Contracts Provide

- Using the Multiple Award Schedule (MAS) Program significantly reduces acquisition time.
 - Orders can be awarded in days rather than months.
 - Competition is streamlined
 - Easy access to the right industry partners.
 - Streamlined Blanket Purchase Agreements (BPA) procedures.



Opportunities MAS

- A premier acquisition vehicle in government, with approximately \$40 Billion a year in spending
- IWACenter averaged over \$2.6 Billion annually between FY08 FY15

General Service Administration 3D Printing/Additive Manufacturing (3DP/AM) Total Solution

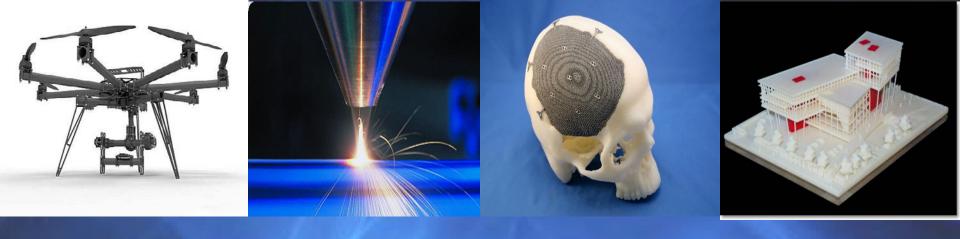


General Service Administration 3DP/AM Schedule 36 SIN 51-400 3D Printing Solutions

> 3D Printing includes printers; ancillary equipment, technical services and supplies required to generate functional prototype images and printed objects. Equipment may include all classes and sizes of 3D Printers, laser imaging devices, post processing devices and ancillary accessories and software to produce functional items. Technical services include but are not limited to: 3D Printing and laser imaging to produce a digital file used to generate functional prototype images and printed objects. All types of consumables and other items related to this SIN are included.



- > 3DP/AM Total Solution not captured.
- DoD estimated spend for FY17-FY19, \$3.8 billion.
- Defense Appropriations FY15 Committee Report "Committee encourages the Secretary of Defense to research creative applications for AM technology."



Strategic Vision for 3DP/AM

A comprehensive group of 3DP/AM products, and services that can equip a new or retrofit an existing 3DP/AM machining center that covers the manufacturing life-cycle from design concept-to rapid prototyping-to mission critical part.

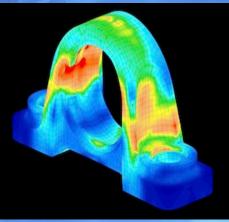


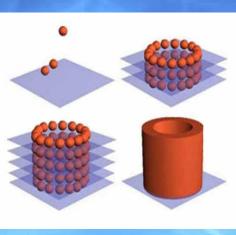
Ten elements define our Total Solution approach.

- 1. Software
- 2. Metrology
- 3. Materials
- 4. Additive Processes
- 5. Post Processing
- 6. Additional Equipment and Systems
- 7. Accessories
- 8. Construction Services
- 9. Ancillary Services
- 10. Service Providers

Software Applications "Digital Thread"



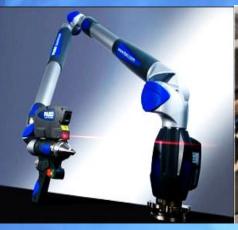


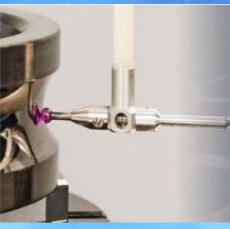




Metrology "The Science of Measuring"





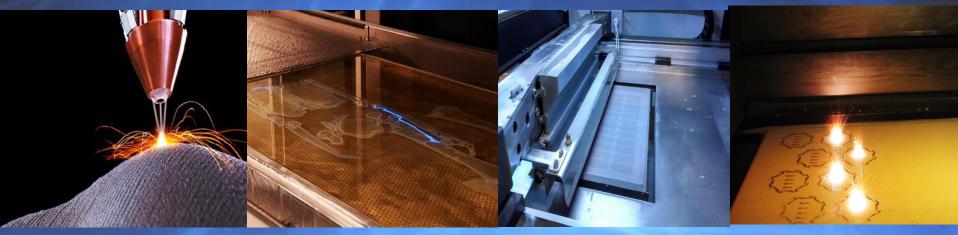






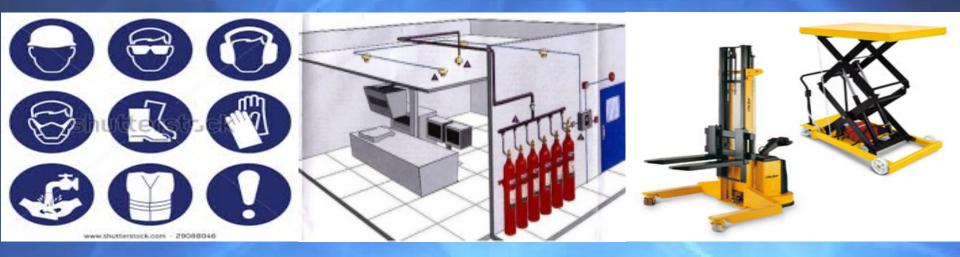
Carbon Fiber Reinforced ABS Filament

Additive Processes "The Elite Eight"



- 1. Directed Energy Deposition (DED)
- 2. Electron Beam Welding
- 3. Powder Bed Fusion (PBF)
- 4. Binder Jetting
- 5. Material Extrusion
- 6. Material Jetting
- 7. Lamination
- 8. Stereolithography (SLA)

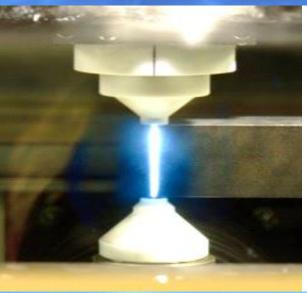
Accessories, Additional Equipment, and Systems "As Required"



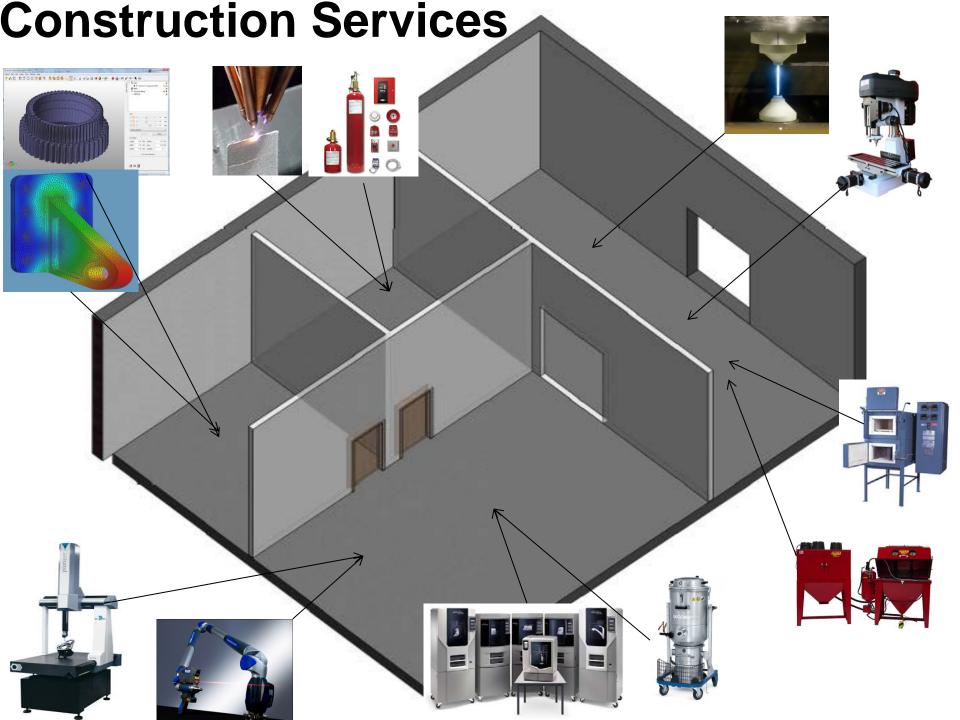
Any product or system that ensures personnel and workplace safety while maintaining the design intent and integrity of the finished part and equipment.

Post Processing "Finished Part"







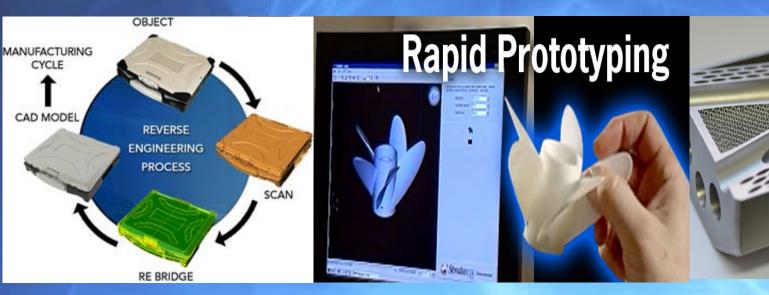


Ancillary Services

- Equipment Training Initial and On-Going
- On-Site Maintenance Response



Service Providers "Reverse Engineering, Prototyping, Part Production"





Achieving Mission Success

- Promote savings by leveraging the federal government's buying power.
- Established relationships with industry partners.
- Assisting federal agencies in meeting their operational mission requirements.
- Development of subject matter experts within the 3DP/AM industry.
- Effective use of the MAS program.
- Expediting award of contracts.

GSA 3D Printing/Additive Manufacturing Solutions

Managed By:

GSA Region 3
Federal Acquisition Service
Integrated Workplace Acquisition Center

3D Printing Solutions Schedule 36 SIN 51.400



Federal Division

Create Better Ideas

Phillips / 3D Systems and On Demand Parts

Introductions:
Gary Bredael
Tim McClanahan

GSA Schedule Contract: GS-03F-080CA Full line of 3D Systems Printers, consumables, and Geomagics

A Little about Phillips Corporation

Phillips Corporation is a family run machine tool business founded in 1961. Originally named Phillips Machinery and Supply, we sold industrial supplies and light machine tools to local industry. Today, Phillips Corporation is an International leader in the manufacturing technology field.

Federal Division worked with the Federal Government exclusively for almost 60 years and has never defaulted on a contract.

Federal Division was the first machine tool dealer to secure a GSA Contract.

Federal Division partnered with the United States Army to provide mobile machine shop sets to overseas campaigns.

Federal Division has been a partner and GSA dealer for over 20 years.

3D Systems

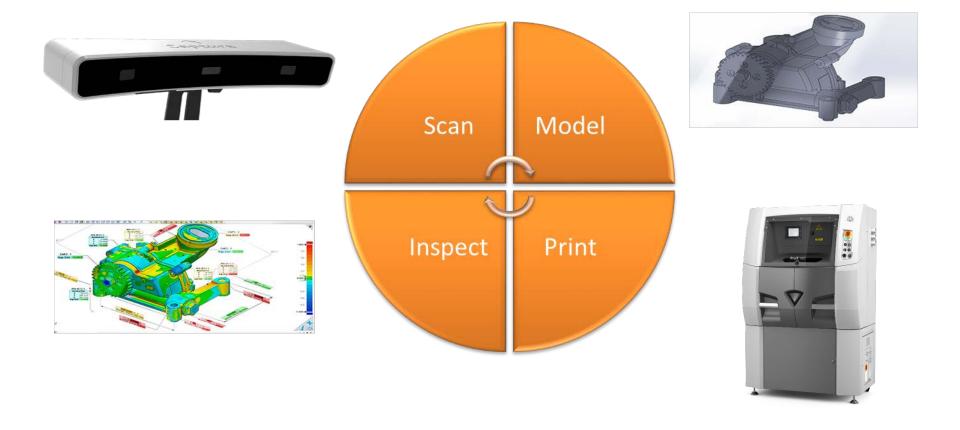
3D Systems is the inventor of 3D Printing.

3D Systems provides the most advanced and comprehensive 3D digital design and fabrication solutions available today, including 3D printers, print materials and cloud-sourced custom parts.

"On Demand Parts"

manufacture the future now

The Perceptual Design Pie



Idealized from Damaged

Make Good Parts from CAD

Make Good Parts from BAD

Parts from imperfect Physical Examples With Verified fidelity



Federal Division

Additive Manufactured Projects



Honeywell T Hawk



Raytheon AQS – 20 Minesweeper



LOGOS - Kestral

Direct Metal Example

GE LEAP Engines 3D Printed Fuel Nozzle

25% Lighter5 times more durableMore Fuel Efficient



Federal Division

PERSONAL







Price: \$20,000 - \$325,000

PRODUCTION

Price: \$300,000 - \$975,000

Lower price points

High Performance



Question and Answer session

Thank you for your time and we look forward to serving you.

Gary Bredael, Tim McClanahan



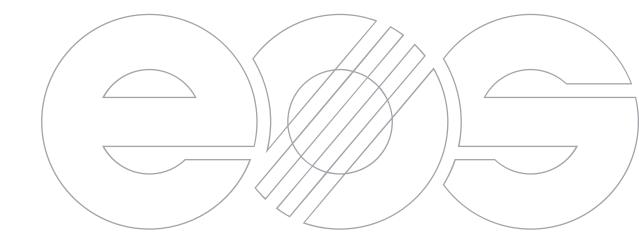




Additive Manufacturing via Functional Parts Manufacturing.

GSA Additive Manufacturing Industry Day.

Bill Cowan
Sales Manager
EOS REP Mid Atlantic Region
December 2015





- Tuckahoe 35 years Machine Tool Distribution.
- Small Company Women owned representing:
 - EOS: GSA Contractor, and Representative Mid Atlantic States.
 - Additive manufacturing metal and plastic.
 - Functional Parts.
 - GF Machining Solutions: GSA contract holder for:
 - Mikron High Speed Milling Machines.
 - Agie Charmilles EDM's.
 - Laser Texturing.

3D Printing Machines and Powders on GSA-Advantage



The EOS products on GSA-Advantage are all of the current EOS metal and plastic machines. Also all of the FOS and ALM. powders are on the schedule.

Powder Containers



EOS Materials Plastics ALM Materials Plastics EOS Materials Metals

FORMIGA P 110



ESO INT P 760



EOS M 290



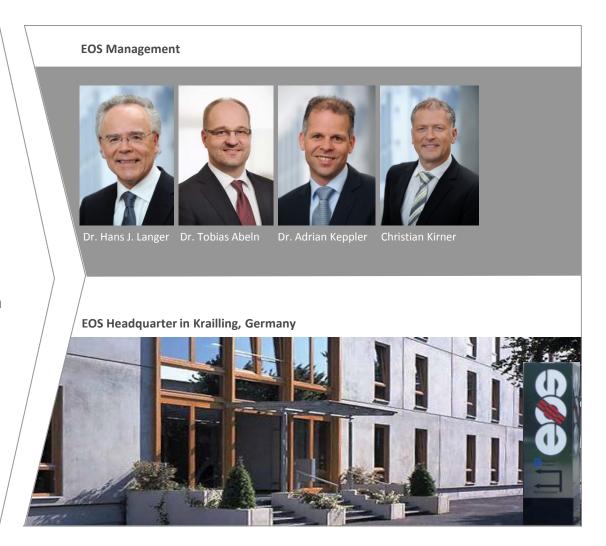
EOS P 396



EOS: Technology and Market Leader for Design-Driven, Integrated e-Manufacturing Solutions



- **Family-owned**, founded in 1989,
- Headquartered in Krailling near Munich, Germany
- Integrated solution provider for **Additive Manufacturing**
- Solution portfolio: Additive Manufacturing (AM) systems, materials (plastics and metals), software and services
- Complete end-to-end solutions: from part design and data generation to part building and post-processing
- EOS enables competitive advantages for a variety of industries, such as medical, aerospace, tooling, industry, lifestyle products and automotive
- EOS is committed to: Innovation – Quality – Sustainability



EOS: Global Presence



EOS worldwide installed base

> 1,600 systems

- 1/3 Metal systems
- ⅔ Polymer systems
- 266 customers with more than 1 system

EOS global footprint

- Customers in 51 countries
- EOS Sales & Service offices in 11 countries, distribution partners in 22 countries
- More than 500 employees worldwide (74% Germany, 26% International)
- Strong patent portfolio: More than 700 active patents in nearly 100 patent families
- R&D spendings of approx. 15% of Sales



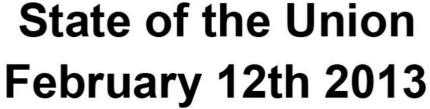




GSA and Additive Manufacturing:

- Separate Schedule for 3D Printing Additive Manufacturing:
 - Schedule 36, Category 51 400
- Public Private Partnerships
 - America Makes
 - DARPA
 - DOD
 - FDA, NIST, FBI, LOS Alamos Labs etc.









Why should our government be interested in additive manufacturing?

- 1. Increase speed of development. Ex. NASA, DOD, National Labs, DARPA, FDA.
- 2. Increase Speed to manufacture critical parts. Ex. DOD
- 3. Manufacture custom parts for wounded wariers. Ex. Cranial Implants, prosthesis.
- 4. Manufacturing Drones.

Why is Additive Manufacturing (AM) a Game Changer?



Challenges

- Faster "Time-to-Market" combined with shorter lifecycle
- Customization of products
- Differentiation by customer value add
- Cost pressure
- Increased flexibility in production ("factories around the corner")
- Increasing focus on sustainability

Readiness for a revolutionary technology



CJ Howard rock climbing in California with his DMLS™ customized rock climbing prosthesis grown in Ti64 material

Slovakian healthcare pioneer relies on EOS technology for patient-specific cranial implants



Medical

Challenge

Provision of technology and material for the production of precision implants for cranial, jaw and facial bones using Additive Manufacturing.

Solution

The manufacture of customized, patient-specific implants from biocompatible titanium alloy, using the EOSINT M 280.

Results

- Patient-specific: form precision leads to reduced side-effects
- Efficient: lower error-rate during production and constant manufacturing costs with increased precision
- Approved: implant registered by the Slovakian State Health Authority (SIDC)

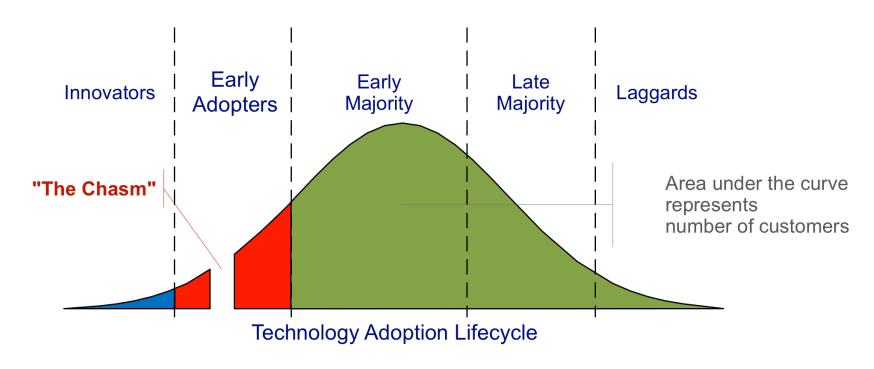
Additive manufactured skull implant made of titanium





What Phase Are We In?





Courtesy: Geoffrey A. Moore, "Crossing The Chasm"

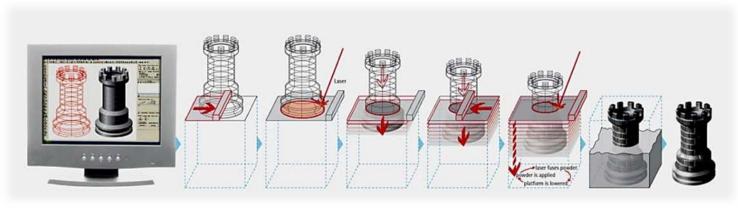
What is DMLSTM? Direct Metal Laser Sintering

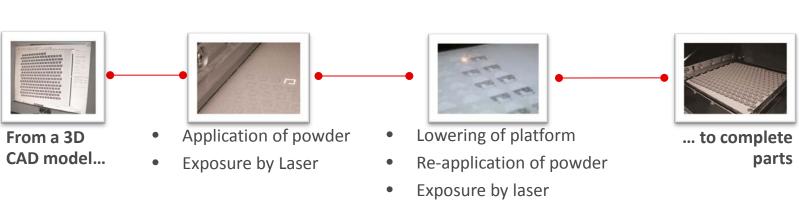


Functional principle:

Parts are produced by layer-wise application of powder and exposure to a laser

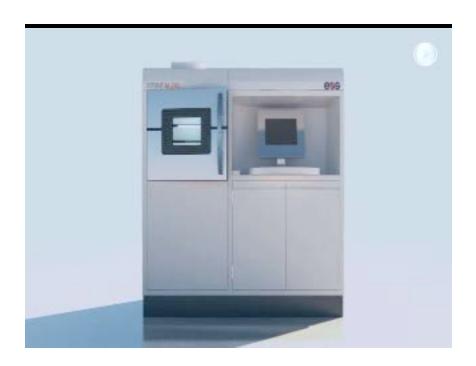
Materials: plastic, metal, and sand





Machine In Action



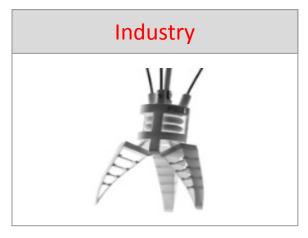


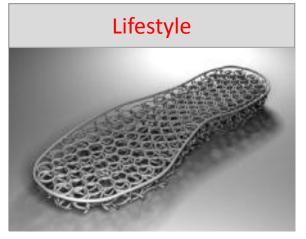
Laser Sintering Benefits Major Industries











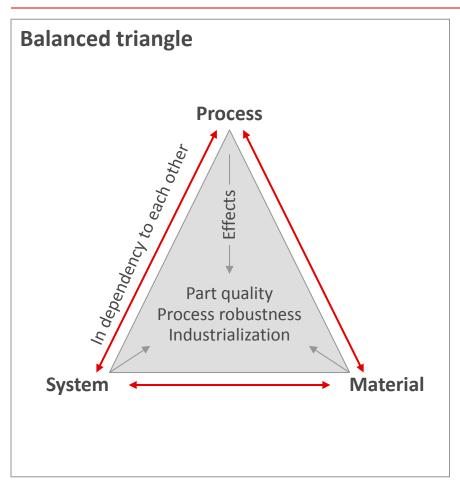




Our technology activities are seamlessly linked to our strategy resulting in various challenges



EOS: Strategy basis and resulting challenges





The ParameterEditor Allows to Change Parameters for Process Development



EOS ParameterEditor

Package includes licenses for

Baseline: parameter values for available layer thickness for respective material

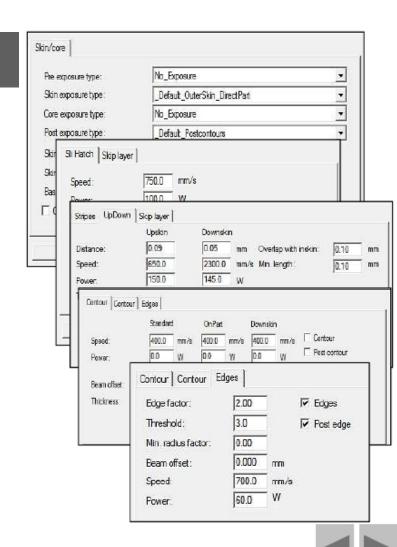
ExposureEditor: editing functionality

Material: machine settings and controls (EOS ParameterSet(s))

Flexible and Open

- 1. Select from multiple exposure types for pre-exposure, skin, core, contour and supports
- 2.Edit multiple parameters per exposure type such as laser power, scan speed, hatch
- 3. Assign to entire job and/or each part

Over 240 editable parameters



What Can Be Edited?



Global modifications

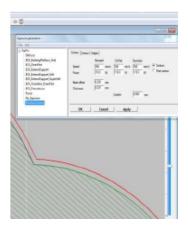
Global beam offset
Focus/defocus: exposure per
part or per layer
Material (via PPP-Job)
Gas flow (LAS 400N)
Scaling in X,Y,Z
Defocus (beam expander wheel)
Powder feed



Parameter set consisting of

Contour parameters upskin
Contour parameters inskin
Contour parameters downskin
Hatching parameters skin
Hatching parameters core
Support parameters

For the areas above the parameters on the right can be varied



Parameters for every

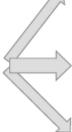
Contour parameters
Number of contours
Laser power
Scanner speed
Beam offset
Pre-/postcontour

Hatch

Scanner speed
Line distance
Beam offset
Hatching strategy
Stripe width
Skywriting

Laser power

Thickness of skin and core





The modular EOS monitoring solution covers the key factors to ensure highest product quality



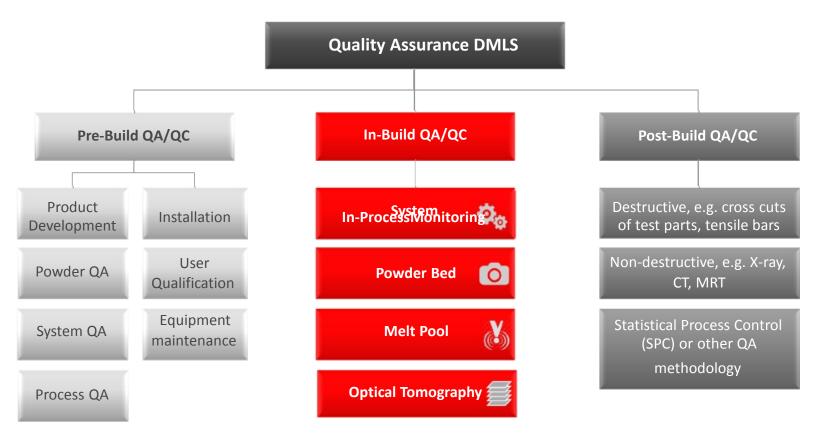
e-Manufacturing Solutions

System Monitoring			
☐ Monitoring and controlling all system settings and process parameters			
☐ Ensuring optimal machine and process conditions as a prerequisite for highest part quality			
Powder Bed	Melt Pool	Optical Tomography	
☐ Recoating quality ☐ Exposure quality	☐ Energy input ☐ Homogeneity of melt pool	☐ Energy input (Streckenergie) ☐ Temporal behavior of light (e.g. Nachglühen von Spratzern)	
 □ Correlation to metallurgical and mechanical properties □ Dimensional conformance (part accuracy and detail resolution) 		 □ Direct correlation to metallurgical and mechanical properties □ Dimensional conformance (indirect) 	

In-Build QA/QC is an essential element for a holistic Quality Assurance System for DMLS



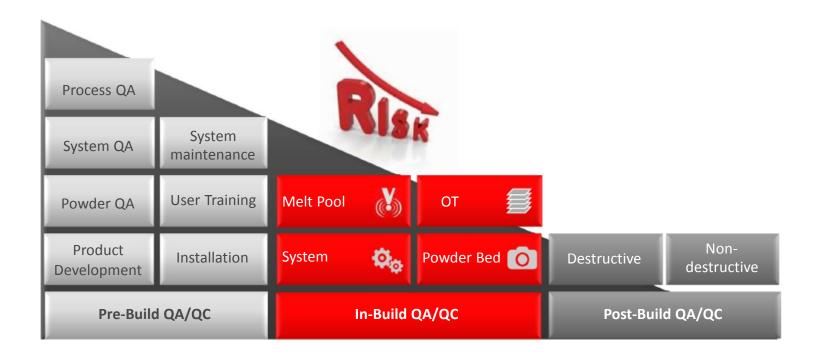




Value Add: Risk reduction







Risk reduction is a key aspect when moving DMLS towards production – together we can reduce it to a minimum.

Complex Metal Parts





EOS Pursues a Platform-Based DMLS™ Strategy-From R&D to Production



Large scale Production Platform*



Scale up for production

Focus on production

- Semi-automated processes
- Modular concept
- Single field with 1kW laser
- Multi-field with 200/400W lasers
- XL build chamber (400x400x400mm)

R&D / small scal Production Platform



- Develop & qualify applications
- Freeze system settings for production
- Produce small scale volumes

Focus on flexibility

- Designed for flexible material exchanges
- 200 / 400 W laser
- Build chamber (250x250x325mm)

Application specific ¹⁾



Adapt to application

Focus on application

- Adapted system to match requirements of specific applications
- Dedicated materials and parameters (e.g. gold)

Materials for EOSINT M systems



Name of material	Material type material	Typical applications
EOS MaragingSteel MS1	18 Mar 300 / 1.2709	Injection moulding series tooling; engineering parts
EOS StainlessSteel GP1	Stainless steel 17-4 / 1.4542	Functional prototypes and series parts; engineering and medical
EOS StainlessSteel PH1	Hardenable stainless 15-5 / 1.4540	Functional prototypes and series parts; engineering and medical
EOS NickelAlloy IN718	Inconel™ 718, UNS N07718, AMS 5662, W.Nr 2.4668 etc.	Functional prototypes and series parts; high temperature turbine parts etc.
EOS CobaltChrome MP1	CoCrMo superalloy	Functional prototypes and series parts; engineering, medical, dental
EOS CobaltChrome SP2	CoCrMo superalloy	Dental restorations (series production)
EOS Titanium Ti64	Ti6Al4V light alloy	Functional prototypes and series parts; aerospace, motor sport etc.
EOS Aluminium AlSi10Mg	AlSi10Mg light alloy	Functional prototypes and series parts; engineering, automotive etc.
DirectMetal 20	Bronze-based mixture	Injection moulding tooling; functional prototypes

Further materials are under development IN625, Hastalloy X, 316L....

EOS Systems for the Additive Manufacturing of Polymer Parts



FORMIGA P 110: Compact system for RP applications and small series



Usable build size

- Width 200 mm
- Depth 250 mm
- Height 330 mm
- Max. volume: 16.5l per build

Main properties

- Highest detail resolution and final part accuracy
- Production flexibility
- Small machine footprint (1350x1040x2200 mm) for fit into every production environment

EOS P 396: Productive mid-volume polymer laser sintering system



Usable build size

- Width 340 mm
- Depth 340 mm
- Height 600 mm
- Max. volume: 69.4l per build

Main properties

- The "workhorse" in the midvolume segment
- High mechanical homogeneity across full build volume thanks to EOSAME feature

EOSINT P 760: Largest build volume for polymer parts



Usable build size

- Width 700 mm
- Depth 380 mm
- Height 580 mm
- Max. vol.: 154.3l per build

Main properties

- High-volume production
- Large part sizes
- Double-laser system
- Extensive portfolio of periphery for maximum system productivity (e.g. CoolDown Station)

EOSINT P 800: For high-performance polymer parts



Usable build size

- Width 700 mm
- Depth 380 mm
- Height 560 mm
- Max. volume = 149l per build

Main properties

- First and only ultra-hightemperature material system (EOS PEEK HP3, melting point of 372°C)
- Option to reduce build size enabling cost-effective production of fewer parts

IDT 2014 | Materials Material Choice Navigator





PA 2201 - PA12

Natural colour

PA 2202 black - PA12

Anthracite-black colour

PrimePart FR - PA12

- Flame retardant
- Refreshable



PA 2210 FR - PA12

- Flame retardant
- Non-halogenated



PA 1101 - PA11

- High impact
- High elongation



■ Soft, rubber like 🥌

Soft, rubber like material

PrimePart ST- TPE/PEBA



PA 2200

- White colour
- General purpose

PA 2105 - PA12

Dental models



PrimePart PLUS – PA12

- Low refresh
- Highly economical



PrimeCast101-Polystyrene

Patterns for investment casting

Alumide - PA12

- Aluminium-look
- Good postprocessability



PA 3200 GF - PA12

- High stiffness
- Low warpage



CarbonMide-PA12

Very high strength and stiffness



EOS PEEK HP3 – PAEK

 Highest mechanical and chemical performance

Supporting Capabilities



Conventional Technologies







CNC Machining



Extrude Hone



HIP Furnace

Connected Technologies



Software Tools



Organic Structures



MMP

Post Processing















3D Printing Machines and Powders on GSA-Advantage



The EOS products on GSA-Advantage are all of the current EOS metal and plastic machines. Also all of the FOS and ALM. powders are on the schedule.

Powder Containers



EOS Materials Plastics ALM Materials Plastics EOS Materials Metals

FORMIGA P 110



ESO INT P 760



EOS M 290



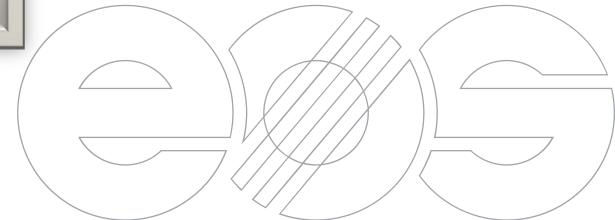
EOS P 396





Thank you for your attention!





www.eos.info

PROTOTYPE & MANUFACTURING SERVICES™

General Services Administration
Region 3 Federal Acquisition Service IWA Center
3D Printing/Additive Manufacturing Industry Day
Presenter – Doug Hardina

December 10, 2015



Agenda

- Who is GPI Manufacturing Inc.?
- How DMLM works
- DMLM Finishing
- Designing for Additive
- How to Achieve an Additive Program



About GPI Manufacturing Inc.

- Privately owned service bureau providing rapid prototyping and contract manufacturing through the use of additive technologies.
- One of the first DMLM service providers in the country!
- We have experience using the best metal printing technology available!
- We love what we do!



Equipment EOS M270/280/290 3D Systems ProX

- Ideal for both Prototype & Production Parts
- Builds complete in Hours/Days
- Layer by Layer, Additive Manufacturing
- Produce Functional Parts With:
 - Complex Geometries
 - Excellent Mechanical Properties
 - High Hardness & Strength







DMLM Basics

- Metal parts of the most complex geometries are built layer-by-layer directly from 3D CAD data without tooling
- Parts have excellent mechanical properties,
 able to be welded, tapped and machined.
- DMLM produces parts that can be built in a matter of hours or days rather than weeks.
- Accelerating design cycles and time-to-market while enabling multiple redesigns affordably.
- Parts can be functionally tested in the environment for which they were designed



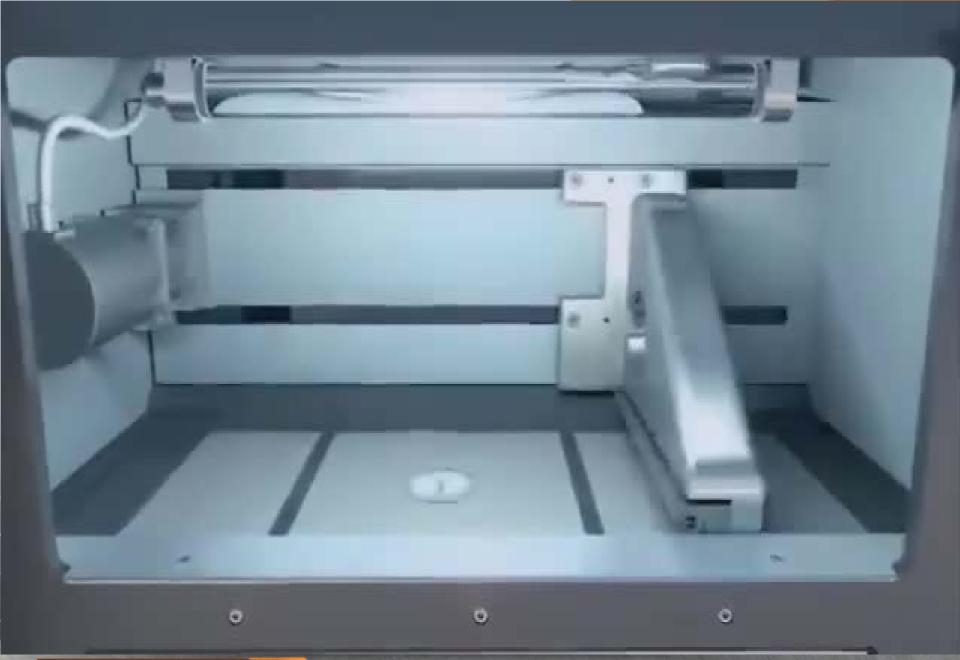


HOW DMLM Works

- The cad is sliced into 20-40µm layers and fed to the machines program.
- A layer of powder is brought over the build plate and the laser melts the powder to the build plate to start the build.
- Every part is built directly on to a build plate.
- The part is then built layer by layer until done.
- The part is then cut from the plate, support material removed and any post finishing that is requested by the customer completed.







DMLM Materials

- Cobalt Chrome
- Maraging Steel (MS1)
- Nickel Alloy IN 718 (Inconel)
- Stainless Steel 316L
- Stainless Steel (PH1)
- Stainless Steel (GP1)
- Titanium Alloy Ti-64
- Aluminum



DMLM Surface Roughness

- Raw DMLM parts are about 150-250 Ra directly off the machines (material dependent)
- Shot peen/blast improves the part to an average of 125 150 ra
- DMLM Parts can be finished up to 16 Ra hand polish or 1ra machine polished



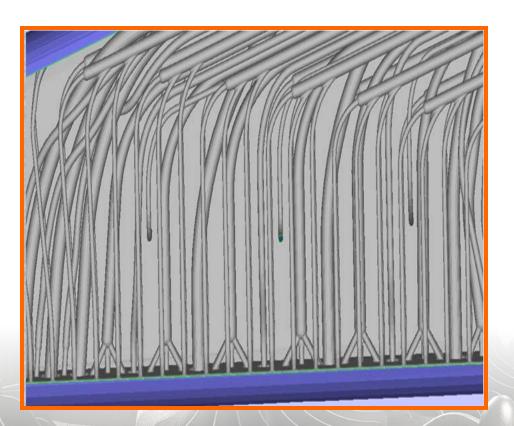


Designing for Additive!





Internal Channels and Cavities



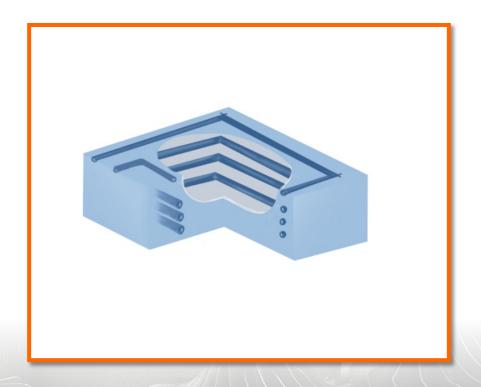


- Routing options for internal channels are almost infinite
 - Create ideal flow channels
 - Well defined distance from cavity walls

Conformal Cooling



Design Differently





Traditional Machining

Additive Manufacturing



How to Achieve an Additive Program

Here's how we recently started a long term contract with GE

- Capability Assessment: Part & Process
 - GPI Manufacturing Inc. supplied the knowledge and labor base for process utilization involving EOS 290 equipment to successfully build the part
 - GPI was qualified to develop and implement the production process requirements required by the customer



How to Achieve an Additive Program

Process Definition

- Mutual agreement upon Frozen Process requirements were established. These include:
 - Destructive and non-destructive part qualification
 - Material Procurement (vendors, powder qualities)
 - Lot certifications
 - Secondary Processes (HIPing, Solution HT, post-machining)
 - Machine calibration schedule and qualification
 - OEM involvement (EOS technical support for maintenance)
 - Plant improvements (3 additional machines/power infrastructure)
 - FMEA identification and program documentation



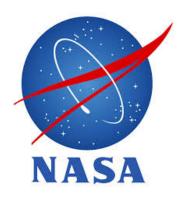
How to Achieve an Additive Program

Produce and Maintain

- GPI has a dedicated engineer: oversee all aspects of contract manufacturing projects
- GPI has the infrastructure: 9 DMLM machines, 25
 DMLM employees, OEM and vendor relationships
- GPI has skill maintaining the process to make sure the part genome is in place – serialization of components
- GPI has the focus, experience and expertise to successfully execute your contract manufacturing program



GPI Manufacturing Customers









BLUE ORIGIN



Raytheon F.T.N





Sandia National Laboratories



NORTHROP GRUMMAN



ISO 9001:2008 AS9100:2009Rev C ISO 13485:2003 ITAR

Conclusion

- DMLM opens new frontiers
 - Prototyping and Additive Manufacturing functional parts.
 - Design freedom. Create what couldn't be done before!
 - Quick lead times
 - High quality parts
- Ability to manufacturer parts faster!
- Low volume production without penalty of tooling costs!



Doug Hardina

Account Executive
GPI Prototype & Manufacturing Services Inc.
DougH@gpiprototype.com
847-615-8900
www.GPIprototype.com

THANK YOU!







GSA 3D Printing Industry
Day
12/10/2015 Philadelphia
Presented by
Digital Plaza
GS03F0055X, GS03F011DA





The Good (1)

- 1. \$40 billion government opportunities
- 2. 80% of Schedule Holders are small business
- 3. Federal Government Agencies have incentive to use **small-business set asides**.
- 4. 5 Years/20 years contract opportunities







The Good (2)

- 5. Easy and fast ordering procedures for government agencies
- 6. Unlimited contract amount
- 7. Only 4% of Federal Government contractors have GSA, which provides market barriers and less competition
- 8. GSA brings credibility to small business.







The Bad

- 1. 60% of GSA Schedule Holders do \$0 sales
- 2. Can be expensive and takes time to get a schedule
- 3. Limited/Negotiated margin
- 4. GSA must have "Most Favorable Customer" (MFC) status







The Ugly

- 1. Time, expense and effort to get a schedule
- 2. Annual or biannual auditing from GSA
- 3. Requires compliance with GSA rules and administrative procedures
- 4. Every change must be submitted for approval.







GSA Schedule 36 3D Printing Team

- 1. Very committed to the product line
- 2. Knowledgeable and supportive
- 3. Much quicker than other GSA schedules







Conclusions

1. Great opportunities if you are willing to make a complete and total commitment to the process

OR,

2. Use companies like us who spend 100% of our time in the marketplace







3D Print/Additive Manufacturing Industry Day

December 10, 2015





RDECOM's Additive Manufacturing Vision

Lester Hitch
Production Manager
Rapid Technologies and Inspection Branch
Advance Design and Manufacturing Division
Edgewood Chemical Biological Center

U.S. Army RDECOM December 10, 2015

DISTRIBUTION STATEMENT C. Distribution authorized to U.S. Government Agencies and their contractors (export controlled) (25 Nov 2014). Other requests for this document shall be referred to HQ RDECOM, APG, MD.



Bottom Line Up Front

Additive Manufacturing (AM) technologies bring the promise of enhanced performance with the flexibility of point of need manufacturing, repair of DoD assets and the ability to reduce part requisition and fulfillment cycles

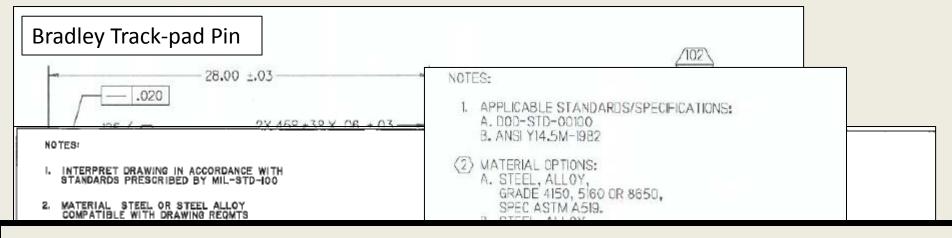
RDECOM is working with academia, industry and across government organizations to mature AM in the following areas:

- Material performance: Capturing pedigreed material data to inform design and engineering of AM parts; Emphasis on materials not being addressed by industry (i.e. Steel alloys, Aluminum Chem-Bio resistant polymers, etc)
- Machine performance: Identifying, improving and documenting key process parameters to enable qualification and certification of AM for Army use
- Digital Product Data: Emphasis on establishing digital product data as the authoritative source for product data; Verification and validation of model quality and data elements prior to driving the manufacturing process

A methodical, phased approach to maturing AM technologies is key to realizing AM as a viable tool within the Army's toolbox

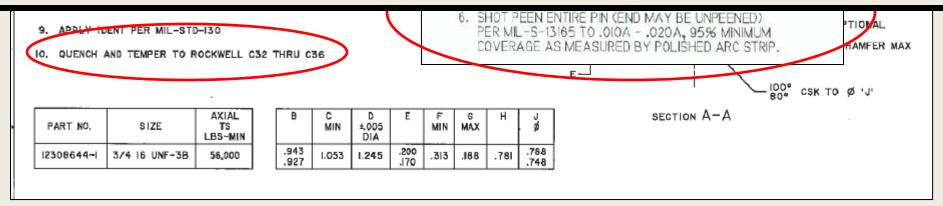


Case Study: Bradley Track Pad Pin/Nut



Preliminary Findings/Lessons Learned:

- AM is a tool that should be used when engineering judgment, business case analysis and part performance warrant such a decision
- AM must often be combined with Subtractive Manufacturing to achieve the final part
- Digital product data is key to realizing the benefits of AM

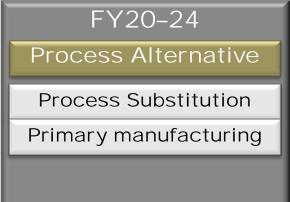




RDECOM AM Focus Areas

Three 5-year progressive stages of adoption with four distinct pillars of investment:







Pillar 1: Material and process certification and qualification

Pillar 2: Army Additive Manufacturing Knowledge-base

Pillar 3: Machine Technology and Material Improvements

Pillar 4: Transfer technology to the industrial base and field

Level of complexity from low to high, evolving from part to system, and from early adopters to traditional acquisition



Part Substitution



AM Efforts Today: Part Alternative



Material Costs						
	Weight (g)	Process Waste (g)	Build Time (min)*	Cost**	COTS Price***	
Washer	1.95	0.20	<2	\$0.23	\$0.13	
Nut	5.32	0.53	5	\$0.61	\$0.53	
Bolt	19.34	1.93	15	\$2.23	\$1.82	

*Does not account for post-processing time **Determined using 4340 at \$105/kg **Catalogue price for MIL-SPEC Grade 8 hardware

- 4340 Alloy steel hardware printed using DMLS
- Demonstrated the ability to print functional parts at the point of need
- Established an initial business case for part substitution via AM



Rapid Prototyping, Product Development and Fielding





Repair and Point of Use manufacturing using LENS and Cold Spray processes

Technology Challenges:

- Material limitations
- Process/machine limitations
- Post processing requirements
- Lack of standards
- · Lack of digital product data
- Hype cycle and managing expectations



RDECOM Efforts to Enable the Future of AM for the Army

Material Performance: Research into materials of interest to the Army (steel alloys, aluminum, etc) to better understand impacts of evolving microstructure, particle size and processing parameters on final part characteristics

Machine Performance: Demonstration of smaller feature sizes; scaling up machine envelopes; experimenting with **processing environments** (temp, humidity, inert, etc); establishing ruggedized and portable AM capabilities; enabling multi-material/multi-functional machines to demonstrate integrated structural/electronic parts

Digital Product Data: Establishing an enterprise-wide product data management (ePDM) system to archive digital product data; working with the REF and others to create and curate a digital parts library; championing the establishment of standards to elevate digital product data quality and status as the authoritative source for product data



RDECOM Community of Practice

- Primary objective: Coordination of AM activities
- Participants: Primarily RDECOM organizations with invited or ex-officion participation by non-RDECOM organizations
 - Cross-Army participation (HQDA, Organic Industrial Base, PEO/PMs)
 - DoD and non-DoD organizations represented
 - Navy, Air Force, DARPA, DLA, SOCOM
 - NASA, Dept. of Energy, Industry
- Three main focus areas
 - Portfolio review
 - Joint Planning
 - Advocacy and Outreach





Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

Additive Manufacturing is a major component of AMRDEC's mission to plan, manage, conduct research, and provide one-stop life cycle engineering for manned / unmanned aviation weapon systems, missile weapon systems, and related or assigned weapons systems.

Additive Manufacturing Equipment

MakerBots(4)FDM - PolymersLulzBot TAZ ¾FDM - Polymers

Formlabs Form 1 SLA - Photopolymers

Dimatix DMP-2831 Inkjet printer

Stratasys Objet 350 Connex 3 PolyJet – Photopolymers

Stratasys 400mc FDM - Polymers Stratasys 900 mc FDM - Polymers

Applications

AMRDEC is investigating the following application areas:

- Missile components optimized for weight and frequency tailoring
- Repair of high value aviation components that cannot be repaired traditionally
- Small complex shaped effusion film cooling and non line of sight holes
- Aerospace gears
- Gearbox housings
- Printable materials with embedded electronics
- Tooling and molding
- Composites and composites tooling
- Rapid, low cost inspection of AM components

Current Programs

FY14-16	Additive Manufacturing for Optimized Missile
	Components and Structures
FY15-18	Direct Digital Manufacturing for Helicopter Engines
FY15-16	DMLS to Manufacture Combustion Liners with Shaped
	Film Cooling Holes
FY15-18	AM Used to Restore/Reclaim/Reutilize High Value
	Aviation Assets

FY16-18 Printable Materials with Embedded Electronics FY16 Additive Manufacturing for Aerospace Gear Applications

POCs:

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Benefit to the Warfighter

- Enhanced component designs optimized for performance, weight savings, reduced part count and cost
- Point of need part production
- Improved operational readiness
- Improved availability of spares
- Compressed supply chain

Future Focus

Establish an additive manufacturing facility that will allow the training of engineers in design, analysis, and fabrication of additively manufactured components and structures, enable research particular to AMRDEC's mission, and assist in understanding the material – process - property relationship required for qualification and certification.





Additive Manufacturing at NSRDEC, Natick, MA

NSRDEC utilizes native AM capabilities to support the soldier-focused mission through rapid prototyping and model system fabrication. Primary focus areas for NSRDEC are experimentation support and soldier capability demonstrations in conjunction with requirements development.

Additive Manufacturing Systems

DTM Sinterstation 2500 plus SLS – Polymers

Stratasys Objet 500 Connex 3 PolyJet – Photopolymers Objet30 PolyJet – Photopolymers

MakerBots(3) FDM - Polymers

Z-Corp 450 Binder Jetting – Polymers HyRel System 30M Micropump/ink, paste

Current Programs

FY16-19; Tech Base 6.2-6.3; Concept Feasibility and Technology Demonstration: TRL0-3

Future Focus

- Warfighters fitted with physiological status monitors that sense nutritional deficiencies/needs
- Biometric data transmitted to food printer
- Printer loaded with nutrient dense pre-mix
- AM of nutritionally tailored ration component
- Delivery to Warfighter on or near the battlefield
- NSRDEC capability growth higher capacity with broader materials availability. Expanding rapid prototyping capacity will enable greater support to the diverse portfolio of soldier-centric projects managed at NSRDEC.

Applications

AM equipment is used, in concert with manufacturing techniques, to enable quick turn solutions supporting 6.2-6.3 research focused in the following areas:

- Combat Feeding
- Soldier Clothing and Individual Equipment
- Aerial Delivery Systems
- Expeditionary Basing and Collective Protection

Benefit to the Warfighter

- High iteration concept development for capability validation to inform requirements
- Tailored and Soldier specific solutions
- Ration components tailored to individual Warfighters' nutritional requirements, operational scenarios, and preferences
- Reduced reliance on ration storage and long shelf life
- Reduced ration packaging and field trash
- Sustainment of high-tempo operations occurring at the outer edge of supply lines

POCs:

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Matt Hurley, mtthew.j.hurley8.civ@mail.mil, (508) 233-5904

Combat Feeding:

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Ann Barrett, ann.h.barrett.civ@mail.mil, 508-233-4516





Additive Manufacturing at ARL, APG, MD

ARL's flagship AM facility is housed in the Weapon's and Materials Research Directorate, APG, MD. The research focus for ARL is on materials synthesis and processing science for near net-shape and net-shape AM.

Additive Manufacturing Systems

3D Systems ProX 300 (DMLS/metal)

3D Systems ProX 100 (DMLS+/metal, polymer, ceramic)

EOS P800 (SLS/polymers)

3D Systems ProJet 5500 (PJP/polymers)
3D Systems ProJet 6000 (SL/polymers)

3D Systems Viper Si2 (SL/polymers)

Envisiontec Ultra (SL/polymers)

nScrypt Tabletop (micropump/ink, paste) nScrypt SuperScrypt (6-axis, multi-technology) Benchtop Printers (6) (SL and FDM/polymers)

Near Net-Shape Systems:

Cold Spray Systems (3) (CS/metals + subtractive + NDI)
Fabrisonic SonicLayer 4000 (UAM/metals + subtractive)

Rolls Royce Cranfield SMD (WAAM/metals)

Current Programs

FY13-15; 5 Programs; Material Development; TRL0-3

FY16-18; 9 Programs; Material Development, Matter-Energy Interaction,

Processing Science, Topological Optimization; TRLO-2

Future Focus

Process Optimization through process-property-structure excogitation, process feedback, and process modeling. Tailoring macro-structure by deliberate design and control of micro-structure.

Applications

AM equipment is used, in concert with other advanced manufacturing and characterization techniques, as research tools for the development of materials and technologies for the Army's Future Expeditionary Force. 6.1-6.2 research focused on these current and future needs:

- Agile and point-of-use manufacturing
- Recycled and indigenous material feedstocks
- Materials for man-machine interface
- Multi-material processing systems
- Additive + Subtractive + Inspection in one box
- Design for volumetric optimization
- Flexible, conformable and adaptive protection systems
- Joining of 3D electronics and 3D structures
- Biocompatible materials and bio-surrogate materials
- Biomimetic materials and systems
- Depot level and in-field repair
- Boost US manufacturing industrial base

Benefit to the Warfighter

- Reduced logistical burden, BIG Army & locally
- Technology organic to the Soldier
- Soldier protection, individual and mission specific
- Signature management, vehicles and unmounted Soldiers
- Lightweightening, vehicles and Soldier systems

POCs:

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Vic Champagne, victor.k.champagne.civ@mail.mil, 410-306-0822





Rapid Technologies and Inspection Branch - Edgewood Chemical Biological Center

ECBC's flagship AM facility is integrated within Advanced Design and Manufacturing Division, APG-EA, MD. ADM is a Prototype Integration Facility within RDECOM rapidly developing products for the warfighter.

Additive Manufacturing Systems

EOS M270 Dual	DMLS - metals
Stratasys Fortus 900mc	FDM - polymers
Stratasys Fortus 400	FDM - polymers
Stratasys Titan	FDM - polymers
MakerBot Style Benchtops (4)	FDM - polymers
3D Systems Sinterstation 2500	SLS - polymers
3D Systems Viper Si2	SL - polymers
3D Systems 3500	SL - polymers
3D Systems 7000	SL - polymers
FormLab +	SL - polymers
Stratasys Connex500	Polyjet – polymers

Molding/Casting Capabilities:

MK Systems Differential Vacuum Casting Machine. Digital Tooling for casting and composite layup. Rapid Tooling for Injection Molding.

3D-data Capturing Systems:

Surphaser 2500HX, Faro Laser Scan Arm, Konica Minolta Range7, Konica Minolta 910. Scanning scale from a penny to a building.

Current Programs

FY15-FY16 Engineering and production support for Rapid Equipping

Force Expeditionary Lab

FY13/14/15 Material and Application research with University of Delaware

FY15/16 R&D a photo-intiated Polycarbonate polymer in

partnership with ARL's Additive Manufacturing Team

Future Focus

Leverage partnerships with other DoD agencies, Industry and Academia to develop new products for the warfighter.

Applications

AM equipment is used, in concert with other advanced manufacturing and engineering capabilities, as a means to produce and develop technologies for the Army's warfighter and scientist:

- Components optimized for weight and strength.
- Part count reduction.
- Tooling and molding for injection molding, urethanes, silicones, and composites.
- Housing for unique components and electronics.
- Rapid development of concepts.
- Low-cost alternative for customized low-volume production.
- Rapid development and supply of unique theater-deployed components.
- Reduction of supply chain and backorder constraints.

Benefit to the Warfighter

- Enhanced component designs optimized for performance, weight savings, reduced part count and cost
- Point of need part production
- Improved operational readiness
- Improved availability of spares
- Compressed supply chain

POCs:

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Metals Additive Manufacturing at ARDEC - Picatinny Arsenal, NJ

The Army's leading facility in Additive
Manufacturing (AM) of Metals. Located
within ARDEC's Materials, Manufacturing &
Prototyping Technology Division

AM Systems

DMLS EOS M270

- Materials: 4340, Stainless Steel, Titanium, Aluminum, Inconel, Cobalt Chrome
- Specs: 200W laser, .02-.06 layer thickness, 1mm minimum feature size, 9.5" x 9.5" x 7.5" build volume

EBM ARCAM A2X

- Materials: Ti. Ti6Al4V. Inconel. CoCr
- Specs: Capability currently being established

Support & Testing Equipment

Powder Synthesis X-Ray Analysis
Post Processing Hardness Testing
Thermal Stress Relief Mechanical Testing

EDM Equipment Scanning Electron Microscopy

Oxygen Nitrogen Analysis Particle Size Analysis

Future Focus

- New materials systems (functionally graded materials, novel alloys, hybrid materials)
- Fielding of AM parts and AM systems for on-demand Battlefield manufacturing
- Wide range of qualification & certification of materials, processes and parts via additive manufacturing
- Advanced fabrication integration with sensors and electronics

Applications

Additive Manufacturing equipment is used to prototype, develop, and fabricate metal parts via a layer by layer powder bed laser sintering process. The process provides a wide range of design flexibility over traditional manufacturing methods, allowing for rapid prototyping, part weight reduction, novel part design, reduced time to product, and overall manufacturing flexibility.

Benefit to the War Fighter

- Reduced Logistics footprint and Time to Field for replacement parts
- Enabling options to reduce single point failures
- Increase force effectiveness and reduce operations, support, maintenance, and liability costs
- Enabling novel and improved part designs for reduced weight while meeting or exceeding performance requirements
- A qualified, certified, and sustainable process for providing parts on a reduced cost, rapid response, on demand basis

POCs:

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Printed Electronics Additive Manufacturing at ARDEC - Picatinny Arsenal, NJ

The Army's leading facility for to design, development,, fabrication, testing, and integration of Printed Electronics for munitions and weapon systems. Located within ARDEC's Materials, Manufacturing & Prototype Technology Division...

Printed Electronics Systems

M3P 2000 (Multi-tool/multi-material) nScrypt – SuperScrypt (Multi-tool / multi-material)

Dimatix DMP 2800s (Inkjet)

Sonoplot GXII (Ultrasonic Deposition / Direct Write)

Harper Integrated R2R (Flexo / Inkjet / Reel-to-Reel)

Novacentrix PulseForge 1300 (Photonic Curing) Nano-Ink (Dip-Pen)

PixDro / Epson (Inkjet)

Voxel 8 (Multi-material FDM/DW)

LogoJet (Inkjet / UV)

Screening Systems (Screening / Coating)

Integration & Testing Equipment

Sintering / Post Processing Electronics Charecterization Grommet Interconnect Profilometery

Embroidering 2D/3D Scanning

Thermal Cycling Accelerated Aging
Inspection / Microscopy Ink Development

Future Focus

Process Optimization and Scale-Up; Manufacturing Improvements for Novel Chaff; Integration of printed devices for power sources, antennas, and soldier systems. Integration of PE into 3D Structures.

Applications

PE equipment is used, in concert with other advanced manufacturing and characterization techniques to design, develop, fabricate, integrate & test flexible and hybrid electronics into existing and future munitions and weapon systems. Embedded sensing, prognostics & diagnostics, Fuzing, munitions monitoring, structural health monitoring, novel power sources, Hig-G electronics, and numerous other applications. Current Thrusts include:

- Nanomaterials Development / Novel Inks
- Manufacturing & Deposition Techniques
- Testing and Evaluation
- Qualification / Reliability / Survivability
- Flexible Hybrid Electronics
- Power Generation/Energy Harvesting/Power Storage
- Active Sensor Systems
 - Device Miniaturization
- Homeland Defense / Homeland Security
- Muntions & Fuzing
- Components / Sub-Systems Integration
- Remote Weapon Systems

Benefit to the Warfighter

- Reduced logistical burden, BIG Army & locally
- Increased force effectiveness and reduce operations, support, maintenance, and liability costs
- Increase Army readiness by reducing equipment downtime
- Increase safety by providing ammunition assurance
- Improved Testing Capabilities
- Optimized R&D / Systems Engineering

POCs:

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Dave Sabanosh, <u>david.h.Sabanosh.civ@mail.mil</u>, 973-724-3229





Polymer Additive Manufacturing at ARDEC - Picatinny Arsenal, NJ

The Army's leading facility in Additive Manufacturing (AM) of Polymers. Located within ARDEC's Materials, Manufacturing & Prototyping Technology Division

AM Systems

FDM Stratasys uPrint (x2) (ABS)

Stratasys uPrint SE Plus (x2) (ABS) Stratasys Dimension Elite (x3) (ABS) Stratasys Dimension SST 1200 (ABS) Stratasys Fortus 400MC (ABS, ULTEM)

SLA 3D Systems Viper SI2 (Photocure resin)

3D Systems SLA 3500 (Photocure resins)

<u>SLS</u> EOSINT P395 (Powdered plastic and plastic/metal

blends)

Polyjet Stratasys Objet 260 Connex1 (Photocure resins)

Multi-Tool / Multi-Material Systems

Multi-Axis Multifunctional Manufacturing Platform

M3P (Multiple tools)

nScrpt – SuperScrypt (multiple materials)

Testing Systems

Tensile/Flex/Compression/Impact tester

DMA (Dynamic viscoelastic data)

Applications

AM equipment is used to prototype, develop, fabricate parts for form, fit and function testing. AM allows for novel designs and prototyping which can drastically decrease time to end use product. Novel designs, with use of new materials will increase strength and/or decrease weight.

Benefit to the War Fighter

- Reduced Logistics burden, BIG Army and locally
- Increase force effectiveness and reduce operations, support, maintenance, and liability costs
- Improving testing capabilities
- Optimized R&D/Systems Engineering
- Lower weight, better quality of life

Future Focus

Certification and qualification of materials, processes and parts. Fielding of AM parts and AM systems for manufacturing on demand. A method for recycling of waste generated. Improved strength utilizing composites for higher loads and higher confidence in the field.

POCs:

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Additive Manufacturing (AM) technologies bring the promise of enhanced performance with the flexibility of point of need manufacturing, repair of DoD assets and the ability to reduce part requisition and fulfillment cycles – but are not a silver bullet

RDECOM is working with academia, industry and across government organizations to mature AM in the following areas:

- Material performance: Capturing pedigreed material data to inform design and engineering of AM parts; Emphasis on materials not being addressed by industry (i.e. Steel alloys, Aluminum, Chem-Bio resistant polymers, etc)
- Machine performance: Identifying, improving and documenting key process parameters to enable qualification and certification of AM for Army use
- Digital Product Data: Emphasis on establishing digital product data as the authoritative source for product data; Verification and validation of model quality and data elements prior to driving the manufacturing process

RDECOM is pursuing a methodical, phased approach to maturing AM technologies and the use of digital product data to enable AM as a viable tool within the Army's toolbox





Questions/Discussion





RDECOM AM Focus Areas: M240L Example

2015-2019 2025-Beyond 2020-2024 3. Product Stages of 1. Part Alternative 2. Process Alternative **Alternative Adoption** After 10 years (FY24): After 5 years (FY19): After 15 years (FY29+): **Description** M240L barrel can be made via AM, if M240L receiver can be At the design stage, of Capability: M240L is determined to be additively printed as a the business case warrants it, but with produced via AM due to subsystem, thus reducing part M240L no change to the part geometry the ability to print the entire count and leveraging the gun, along with coatings / benefits of AM Individual titanium castings replaced sensors / electronics with AM parts embedded 5 parts now one AM part **Entire M240L produced** via AM



MAS Proposal Process

- Initial steps of the offer process
- Visit www.eoffer.gsa.gov
 - Have you passed the Pathways to Success Training?
 - Did you get your DUNS number?
 - Have you registered with System Award Management (SAM)?
 - Have you applied for a digital certificate?



Additional Required Documents and Questions

- Business plan and Marketing plan
- Last two years of income statements and balance sheets
- Commercial price list
- GSA Proposed Pricing
- Terms & Conditions



eBuy

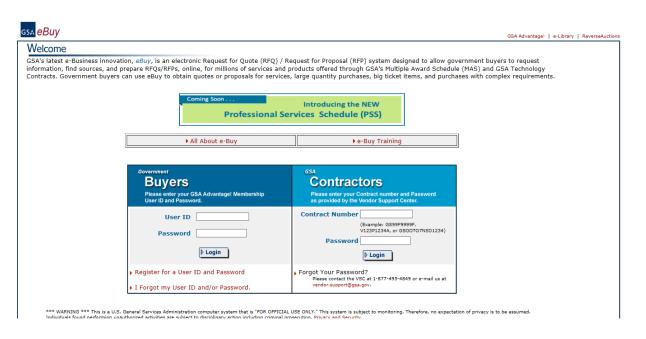
A Tool for Federal Business

Objectives

- What is eBuy?
- What's In It For You?
- Who Uses eBuy?
- How Does It Work?
- Tips and Best Practices
- How Do I Get Access?

What is eBuy?

eBuy is designed to facilitate the request for submission of quotations for commercial products and services between Buyers and MAS Schedule Holders.



Where Buyers Connect With You...

- Products and Services
- Quantity (*Volume discounts)
- High dollar purchases (*Above small purchase threshold)
- Purchases with complex requirements
- Determining Sources of Supply (Request For Information)
- State and Local Government (*Disaster Recovery)

What's In It For You?

- Exclusive to MAS Schedule Holders
- Access to RFI/RFQs
- Request for Quote
- Save time with quick access and responses to RFI/RFQ
- Transparency of purchasing patterns
- Increase customer communication
- Automatic notifications for RFQs

Who Uses eBuy?

Top Ten Agencies	Number of FY 15
	RFQs
Department of the Air Force	12,882
Department of the Navy	11,304
Department of Veterans Affairs	10,377
Department of the Army	8,124
Department of Health and Human Services	4,328
Department of Defense (Office of the Secretary of Defense)	4,227
Department of Homeland Security	3,540
Department of the Interior	2,940
General Services Administration	2,595
Department of Agriculture	2,122

How many RFQs came through this office?

Schedule	Schedule Description	Number of FY15 RFQs
36	THE OFFICE, IMAGING AND DOCUMENT SOLUTION	2,450
71	FURNITURE	8,433
72	FURNISHING AND FLOOR COVERINGS	670
78	SPORTS, PROMOTIONAL, OUTDOOR, RECREATION, TROPHIES	2,978
58 I	PROFESSIONAL AUDIO/VIDEO, TELECOMMUNICATIONS	1,666
71 II K	COMPREHENSIVE FURNITURE MANAGEMENT SERVICES	297
	TOTAL	16,494

How Does This Work?

- 1. Buyer submits Request For Quote (RFQ)
 - a) Buyer identifies vendors to be notified
- 2. E-mail notification sent to identified Vendors
- 3. Vendors view RFQ in their account
 - a) Vendors respond to RFQ
- 4. RFQ Closes
- 5. Buyer reviews process of all quotes submitted
- 6. Award is made

Tips and Best Practices

- Check eBuy daily for new Request For Quotes (RFQ)
- Contact Buyer with questions or clarifications
- Submit quotes before the RFQ closes
- Provide detailed information for Buyer's RFQ

How Do You Get Access to eBuy?

Get on Schedule!



Promoting GSA to the Customer

Sherrie Taylor Customer Service Director GSA/FAS

12/10/2015

GSA Customer Accounts and Research Division (CAR)

- Outreach division of the Federal Acquisition Service
- Provides government customers support in acquisition services and solutions helping them select the best value solution for their needs.

What Does CAR Do?

- Supports the Government Customer by providing training and assistance on how to access and obtain goods and services to meet their critical mission requirements.
 - Provide direct consultation and assistance on the advantages and benefits of using GSA
 - Conducts customized training in how to utilize GSA acquisition vehicles and GSA's eTools

What does this mean to you?

- Vendors need to be educated on how Government Customers make purchasing decisions.
- Most decisions are made after conducting market research.



welcome! GSA eLibrary is your one source for the latest GSA contract award information. GSA offers unparalleled acquisition solutions to meet today's acquisition challenges. GSA's key goal is to deliver excellent acquisition services that provide best value, in terms of cost, quality and service, for federal agencies and taxpayers.

GSA offers a wide range of acquisition services and solutions utilizing a variety of tools, contract vehicles, and services to meet the customer's specific needs including Multiple Award Schedules, Governmentwide Acquisition Contracts, Technology Contracts, and Assisted Acquisition Services. For more information on what GSA has to offer, visit GSA.gov.



Search

3-D Printers

n all the words

▼ Search

enter Keywords, Contract Number, Contractor/Mfr Name, Schedule/SIN/GWAC Number, NAICS

▶ Contractor Directory (a-z)

▶ Cross-Schedule Search

Category Guide

- Winter Supplies & Services
- Hospitality, Cleaning, & Chemicals
- Laboratory, Scientific, & Medical
- Office Solutions
- Security Solutions

Disaster Relief

- Tools, Hardware, & Machinery
- Vehicles & Watercraft

- ▶ Building & Industrial
- Furniture & Furnishings
- IT Solutions & Electronics
- Law Enforcement, Fire, & Security
- ▶ Recreation & Apparel
- Services
- Travel & Transportation Solutions
- ▶ Wildland Fire & Equipment

News...

Introducing the PROFESSIONAL SERVICES SCHEDULE (PSS) Effective September 30, 2015, the MOBIS (874), AIMs (541), FABs (520), Language (738II), Logworld (874V), PES (871) and Environmental (899) schedules will no longer be available as individual MAS programs. All of the services covered under these schedules, and all of the existing contractors will be available under the new PROFESSIONAL SERVICES SCHEDULE (PSS), effective October 1, 2015. Additional information pertaining to the Professional Services Schedule (PSS) program can be found on the Interact - Professional Services Category Community, and from the GSA Professional Services Schedule page.

77 Get Quotes

GSA eBuy is an easy-to-use electronic Request for Quotation (RFQ) system designed to facilitate the request for submission of quotations.



Additional Information

Customers Training Opportunities

- FPDS-NG
- EPLS GCA Stratagic Coursing DDAs

Contractors

- FedBizOps
- Schedules Sales Query
- Vendor Support (VSC)



Schedule Contracts

GSA schedule contracts offer direct delivery of millions of state-of-the-art, high-quality commercial supplies and services at volume discount pricing!

- View schedule contracts GSA schedules info
- VA schedules info
- NAICS schedule/SIN crosswalk PSC schedule/SIN crosswalk

Technology Contracts

GSA technology contracts cover the whole spectrum of IT solutions, from network services and information assurance to telecommunications and purchase of hardware and software. View technology contracts

GSA technology contracts info

iii State and Local Governments

Cooperative Purchasing

Purchase IT products, services, and support equipment from Federal Supply Schedules.

- View participating vendors
- Cooperative Purchase FAQ

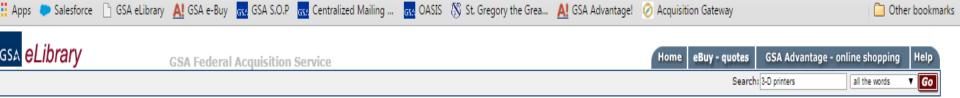
Disaster Recovery Purchasing

Purchase products and services to facilitate recovery from a major disaster.

- View participating vendors



With eBuy, getting quotes is just a click away!

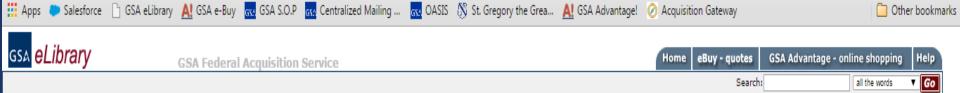


Search Results Summary
Search Criteria: 3-D printers
Did you mean (3d pprinters?

Instructions: Click the source number to view a list of categories. Click the category number (i.e. SIN) to view a list of contractors.

Description matches

Source	Description		
36	THE OFFICE, IMAGINO	G AND DOCUMENT SOLUTION	
	Category	Description	
	51 400	3D Printing Solutions - 3D Printing includes printers ; ancillary equipment, technical services and supplies required to generate functional prototype images and printed objects. Equipment may include all classes and sizes of 3D Printers, laser imaging devices, post processing devices and ancillary accessories and software to produce functional items. Technical services include but are not limited to: 3D Printing and laser imaging to produce a digital file used to generate functional prototype images and printed objects. All types of consumables and other items related to this SIN are included.	



Contractor Listing

Category Description

For general questions, contact: National Customer Service Center Phone: 1-800-488-3111 E-mail: mashelpdesk@gsa.gov



36 THE OFFICE, IMAGING AND DOCUMENT SOLUTION

51 400 3D Printing Solutions 3D Printing includes printers; ancillary equipment, technical services and supplies required to generate functional prototype images and printed objects. Equipment may include all classes and sizes of 3D Printers, laser imaging devices, post processing devices and ancillary accessories and software to produce functional items. Technical services include but are not limited to: 3D Printing and laser imaging to produce a digital file used to generate functional prototype images and printed objects. All types of consumables and other items related to this SIN are included.

5 contractors			Display: All Socio-Econom Small Business Woman Owned Bu		Search Contractor T&Cs/Pricelis		
Download Contractors (Excel)			Hold the 'Ctrl'	key to select all that apply			
Contractor 🔺		Contract #	Phone	City, State ♦	Socio- Economic	Contractor T&Cs /Pricelist	View Catalog
BAHFED CORP	DISAST	GS-03F-026BA	5032088410	PORTLAND, OR	s/v/d/h		GSA Advantage!
DIGITAL PLAZA, LLC	DISAST RECOV	GS-03F-011DA	2157155680	AMBLER ,PA	s/d		GSA Advantage!
GALLOWAY PLASTICS, INC.	DISAST RECOV	GS-03F-098CA	847-615-8900	LAKE BLUFF ,IL	s		GSA Advantage!
PHILLIPS CORPORATION	DISAST RECOV	GS-03F-080CA	410-564-2908	HANOVER, MD	S		GSA Advantage!
TUCKAHOE TRADING INC		GS-03F-015CA	215-353-0785	DOYLESTOWN ,PA	s/w/wo		GSA Advantage!

Questions?



Our Mission

To promote increased access to GSA's nationwide procurement opportunities

- OSBU is an advocate for Small Businesses
- OSBU connects small businesses with people who can help them, and programs that can grow their skills.
- OSBU's nationwide staff of trained professionals has a deep background in contracting and acquisition.
- We also help the small business community reach key contracting experts to help navigate the procurement process.



GSA's FY 2016 Subcontracting Goals

GOALING CATEGORY	GOAL
Small Business	36.50%
Small Disadvantaged Business (SDB)	5.00%
Women-owned Small Business	5.00%
HUBZone Small Business	3.00%
Service-Disabled Veteran-owned Small Business	3.00%



The Five Small Business Contracting Programs are:

Small Business FAR 19.5

8(a) FAR 19.8 HUBZone FAR 19.13

Service-Disabled Veteran-Owned Small Business (SDVOSB)¹ FAR 19.14 Women-Owned Small Business (WOSB) FAR 19.15

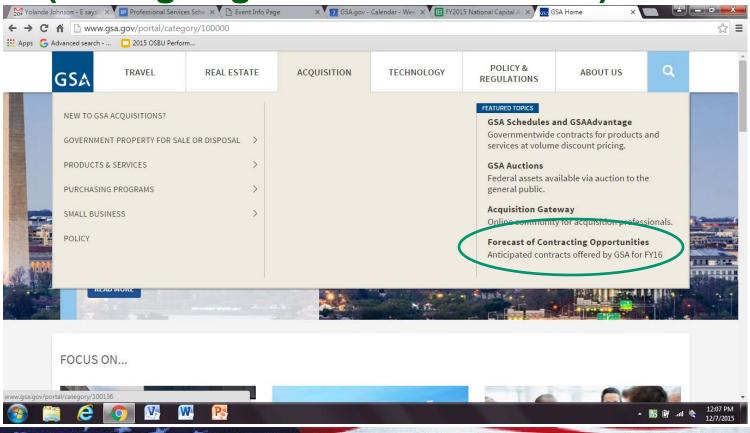
There is **parity among the 8(a), HUBZone, SDVOSB, and WOSB programs** (FAR 19.203, effective as of March 16, 2011.). For these four programs, there is **no order of precedence.**

•Award may be set aside for WOSBs for specific NAICS codes where SBA has designated that WOSBs are substantially underrepresented.
•WOSBs must register with SAM, and with SBA's WOSB Program Repository to participate in the WOSB program. Click on www.sba.gov/wosb for details.

- 8(a)s are by definition small disadvantaged businesses (SDB), the 8(a) Program can be used to meet the agency's SDB goals

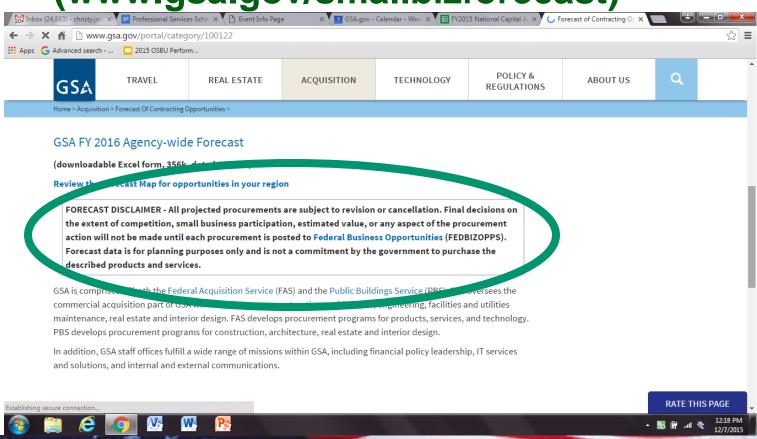


FY 2016 GSA Forecast (www.gsa.gov/smallbizforecast)





FY 2016 GSA Forecast (www.gsa.gov/smallbizforecast)





Website Shortcuts

GSA.gov	SHORTCUTS
Office of Small Business Utilization	www.gsa.gov/smallbusiness
	www.gsa.gov/sbu
Contacts for Small Business Support	www.gsa.gov/smallbizsupport
Doing Business with GSA publication	www.gsa.gov/sub
GSA Forecast of Contracting	
Opportunities	www.gsa.gov/smbusforecast
GSA Subcontracting Directory	www.gsa.gov/subdirectory
Small Business Events	www.gsa.gov/events
Service-disabled Veteran-owned Small	www.gsa.gov/service-disabled
Business Initiative	www.gsa.gov/sdvosb
	www.gsa.gov/21gunsalute
Mentor-Protégé Program	www.gsa.gov/mentorprotege
Recovery Act Opportunities for Small	
Business	www.gsa.gov/smallbusinessrecovery



Charles Aycock Small Business Specialist 202-257-1513 charles.aycock@gsa.gov

Mid-Atlantic Region
Dow Building
100 S Independence Mall W
Philadelphia, PA 19106







Thank You